Biblio NPL

15/5/1 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

6233103 INSPEC Abstract Number: A1999-11-8760I-027, B1999-06-7510N-022, C1999-06-7330-106

Title: Quantitation of articular cartilage **dimensions by computer analysis of** 3D MR **images of human knee joints**

Author(s): Kshirsagar, A.; Watson, P.J.; Herrod, N.J.; Tyler, J.A.; Hall, L.D.

Conference Title: Proceedings of the 19th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. `Magnificent Milestones and Emerging Opportunities in Medical Engineering' (Cat. No.97CH36136) Part vol.2 p.753-6 vol.2

ISBN: 0 7803 4262 3 Material Identity Number: XX-1999-00659

Conference Date: 30 Oct.-2 Nov. 1997 Conference Location: Chicago, IL, USA

Abstract: Loss of articular **cartilage** is clinically one of the most significant change associated with osteoarthritis and, at present, **Magnetic Resonance Imaging** (**MRI**) is the only modality capable of direct visualisation of articular **cartilage** owing to its excellent soft tissue contrast. This work demonstrates the use of **three dimensional** (**3D**) edge detection method for automatic delineation of **cartilage** from **3D MR** images of human knee joints to produce total **cartilage** volume. Topographical distribution of **cartilage** thickness on the surface of bones is also obtained. The reproducibility of **volume measurement** is assessed by repeated **MR** scanning of a healthy volunteer at different **times** . (12 Refs)

15/5/2 (Item 2 from file: 2)
DIALOG(R)File 2:INSPEC

6113050 INSPEC Abstract Number: A9903-8760I-001, B9902-7510N-001, C9902-7330-007

Title: Relevance of susceptibility-induced geometrical distortion for the accuracy of MR **-based** cartilage volume **and thickness** measurement

Author(s): Schnier, M.; Priebsch, J.; Faber, S.; Haubner, M.; Glaser, C.; Englmeier, K.-H.; Reiser, M.; Eckstein, F.

Journal: Biomedizinische Technik vol.43, no.9 p.243-8

Publication Date: Sept. 1998 Country of Publication: Germany

CODEN: BMZTA7 ISSN: 0013-5585

Language: German Document Type: Journal Paper (JP)

Abstract: The aim of the present study was to analyze the relevance of susceptibility-induced geometrical distortion to the accuracy of **MR** -based **cartilage volume** and thickness **measurement** in the human knee joint. Nine cadaveric knee joints were imaged in the sagittal plane with **MRI** at a resolution of 2*0.31*0.31 mm/sup 3/, using a fat-suppressed gradient echo sequence, with a normal gradient orientation and also with the frequency- and phase-encoding directions changed. CT arthrographic data sets were then obtained. On the basis of **3 - D** constructions, we determined the **cartilage** volume and, with a **3 - D** minimal distance algorithm, the thickness distribution, of the patella, femur and tibia. Irrespective of the gradient orientation, good agreement was observed between **MRI** and CT arthrography in terms of **cartilage** volumes and maximum **cartilage**

thickness. With a normal gradient orientation the volume was overestimated by 2.5% in **MRI** , and 2.3% when the gradients were changed. The maximum **cartilage** thickness was underestimated by 0.24 **intervals** (**interval** =0.5 mm) with a normal gradient orientation, and by 0.22 **intervals** when the gradient orientation was changed. In none of the joint surfaces was a relevant difference between the two methods observed. It can be shown that, using high-resolution, fat suppressed gradient-echo sequences-susceptibilit y-induced geometrical distortion has no significant effect on the accuracy of MB-based **cartilage** **volume** and thickness **measurements** . **MRI** would therefore appear suitable for the design of patient-specific finite element models with the aim of analysing load transmission in diarthrodial joints and planning surgical interventions. (20 Refs)

15/5/3 (Item 3 from file: 2)

DIALOG(R)File 2:INSPEC

5668886 INSPEC Abstract Number: A9719-8760I-010, B9710-7510B-018

Title: Short TE MR **microscopy: accurate measurement and zonal differentiation of normal hyaline** cartilage

Author(s): Freeman, D.M.; Bergman, G.; Glover, G.

Journal: Magnetic Resonance in Medicine vol.38, no.1 p.72-81

Publication Date: July 1997 Country of Publication: USA

CODEN: MRMEEN ISSN: 0740-3194

Abstract: The purpose of this study was to use **MR** **imaging** to accurately measure the thickness of hyaline **cartilage** and determine the **MR** contrast parameters for differentiation of **cartilage** zones in normal human **cartilage** samples. **Cartilage** samples were examined using **three** **dimensional** spin-echo **MR** microscopy at 9.4 T with a voxel size of 31*31*300 mu m. Effects of T/sub 2/ signal loss, susceptibility, and partial **volume** on **measured** thickness of **cartilage** were investigated. Thickness measurements were obtained on corresponding histological sections for comparison. Optimal contrast parameters for delineation of **cartilage** zones were evaluated using magnetization transfer, inversion recovery, T/sub 1/, and T/sub 2/ contrast. T/sub 2/ relaxation losses were identified as the primary source of discrepancy between the measured thickness of cortical bone and hyaline **cartilage** . Good contrast for zonal differentiation was obtained using T/sub 1/ weighting. We conclude that images obtained using short TE **MR** microscopy can be used to accurately measure **cartilage** and bone thickness in human specimens, and can demonstrate zones within normal **cartilage** . (26 Refs)

15/5/4 (Item 4 from file: 2)

DIALOG(R)File 2:INSPEC

4765676 INSPEC Abstract Number: A9421-8745-005

Title: A three - dimensional **representation of an athletic female knee joint using** magnetic resonance imaging

Author(s): Steele, J.R.; Basu, A.; Job, A.

Journal: Medical Engineering & Physics vol.16, no.5 p.363-9

Publication Date: Sept. 1994 Country of Publication: UK

CODEN: MEPHEO ISSN: 1350-4533

Abstract: Intense interest in knee joint mechanics has resulted in the development of numerous models to predict forces acting at the knee. However, few models have accounted for the unique geometric characteristics of the knee joint's articular surfaces when predicting the mechanical response of the joint. The purpose of this study was to simulate accurately the complex geometric characteristics of the tibiofemoral joint for input into a finite element model representing the knee joint of athletic females. The right knee of an athletic female with no history of knee joint trauma was imaged using a 0.5 T **magnetic resonance imaging** (**MRI**) unit. Twelve cross-sectional slices of the knee were scanned in each of three orthogonal planes (coronal, sagittal and axial) at slice **intervals** of 6 mm, 7 m, and 8 mm respectively. A scan plan (two coronal images and an axial image) was also generated to enable calculation of the orthogonal scans with respect to one another. Select anatomical reference points representing cancellous and compact bone, major ligament attachment areas, and articular **cartilage** of the distal femur and proximal tibia were digitized from the processed shadowgraphs. The processed digitized data were input into a computer graphics program which was the pre- and post-processing software for the finite element analysis package. Contours of the cancellous and compact bone of the tibial and femoral condyles were generated using beta and cubic spline curves. Bezier quadratic and cubic polynomials were used to reconstruct the tibial and femoral shafts. Accuracy of the model was verified by **comparing** the **shape** and proportionality of the simulated tibia and femur with the **MRI** images from which the model was generated and with anatomical literature. Comparisons demonstrated that subtle variations in the complex geometry of the tibiofemoral joint could be accurately simulated using data obtained from **MRI** scans of an intact knee. Refinements of the **imaging** and digitizing procedures were proposed to provide even greater accuracy in modelling the anatomy of the tibiofemoral joint. (28 Refs)

15/5/5 (Item 1 from file: 5)

11845168 BIOSIS NO.: 199900091277
Cartilage **formation in a hollow fiber bioreactor studied by proton** magnetic resonance **microscopy.**
AUTHOR: Potter K; Butler J J; Adams C; Fishbein K W; McFarland E W; Horton W E; Spencer R G S(a)
JOURNAL: Matrix Biology 17 (7):p513-523 Nov., 1998
ISSN: 0945-053X

ABSTRACT: The ideal in vitro system for investigating the regulation of **cartilage** formation and maintenance would allow for **three - dimensional** tissue growth, a wide range of biochemical interventions, and non-destructive evaluation. We have developed a hollow fiber bioreactor (HFBR) system which meets these criteria. After injection with embryonic chick sternal chondrocytes, neocartilage is elaborated around the hollow fibers, reaching a thickness of up to a millimeter after four **weeks** of growth. This process was monitored over **time** with nuclear **magnetic resonance** (NMR) microimaging and **correlative** biochemical and histologic analyses. Tissue **volume** and cellularity increased greatly during development. This was accompanied by changes in **magnetic resonance** properties consistent with increased macromolecular content. Further, tissue heterogeneity, observed as regional variations in cell

size in histologic sections, was also observed in quantitative NMR images.

15/5/6 (Item 2 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

11516293 BIOSIS NO.: 199800297625
Quantitative relationships of normal cartilage **volumes of the human knee joint - assessment by** magnetic resonance imaging .
AUTHOR: Eckstein Felix(a); Winzheimer Margarete; Westhoff Joern; Schnier Michael; Haubner Michael; Englmeier Karl-Hans; Reiser Maximilian; Putz Reinhard
JOURNAL: Anatomy and Embryology 197 (5):p383-390 May, 1998
ISSN: 0340-2061

ABSTRACT: The objective of this study was to assess the normal range of **cartilage** volumes in the knee joints of healthy adults, the ratio between the patellar, femoral, and tibial **cartilages** , and the **correlation** of the **volumes** with age, body weight, height, body mass index (obesity), patellar bone size, and the diameter of the tibial head. We examined the knee joints of nine healthy volunteers and eleven normal postmortem specimens with an age range of 24 to 82 **years** . The **cartilage** volumes of the patella, femur, medial tibia and the lateral tibia were quantified, using a fat-suppressed FLASH- **3D** sequence (resolution 2 X 0.31 X 0.31 mm3) and digital postprocessing, involving **three - dimensional** reconstruction. The mean total volume of the knee joint **cartilage** was 23,245 mm3, the relative standard deviation (CV%) 19%, and the range 16,341 to 33,988 mm3. In the patella, femur and tibia, the CV% amounted to between 22 and 25%. These joint surfaces occupied a relatively variable proportion of the total knee joint volume, the percentage of the patella being 11 to 22%, that of the femur 54 to 69%, that of the medial tibia 7 to 12%, and that of lateral tibia 11 to 16%. The volumes of the lateral tibia were systematically higher than those of the medial tibia ($P < 0.001$). There was no significant **correlation** of the knee joint **cartilage volume** with age ($r = +0.05$), body weight ($r = +0.38$), height ($r = +0.39$) or body mass index ($r = +0.29$), but a relatively high correlation with the diameter of the tibial head ($r = +0.78$, $P < 0.001$). After normalizing the volumes to this diameter, the CV% of the total knee joint **cartilage** volume was reduced to 13%, its variation being 12 to 21% in the patella, femur and tibia. **MRI** is available for **measuring cartilage volume** during growth, functional adaptation, and tissue loss in degenerative joint disease. The study shows that a wide variation of **cartilage** volumes exists in the knee joints of normal adults. To reduce the variability between individuals, the **cartilage** volumes may be normalized to the head of the tibial diameter.

15/5/7 (Item 3 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

11496851 BIOSIS NO.: 199800278183
Measurement **of localized** cartilage volume **and thickness of human knee joints by computer analysis of** three - dimensional magnetic

resonance **images.**
AUTHOR: Kshirsagar Ashwini A; Watson Paul J; Tyler Jenny A; Hall Laurance D (a)
JOURNAL: Investigative Radiology 33 (5):p289-299 May, 1998
ISSN: 0020-9996

ABSTRACT: RATIONALE AND OBJECTIVES. This work demonstrates a new method for computerized **measurement** of the dimensions (thickness and **volume**) of articular **cartilage** for any specified region of the human knee joint. **Three - dimensional magnetic resonance** (**MR**) images optimized for **cartilage** contrast have been analyzed using computerized edge-detection techniques, and the reproducibility of articular **cartilage** thickness and **volume measurements** is assessed. METHODS. A fat-suppressed, **three - dimensional** SPoiled GRass **MR** sequence (45/7.5/30degree) with total scan **time** of approximately 12 minutes was used to acquire volume images of human knee joints at spatial resolution of 0.6 X 1.2 X 1.2 mm. Measurements were made using six repeated scans for three healthy volunteers over a period of 2 **months** . The subsequent semi-automated image processing to establish total **cartilage** volume and **cartilage** thickness maps for the femur required approximately 60 minutes of operator **time** . RESULTS. The mean coefficient of variation for total **cartilage** volume for the six repeated scans for the three volunteers was 3.8%, and the average coefficient of variation for the user-selected **cartilage** plugs was 2.0%. The **cartilage** thickness maps from the repeated scans of the same knee were similar. CONCLUSIONS. Standard resolution **MR** images with fat-suppressed contrast lead to an objective and reproducible measurement of spatial dimensions of articular **cartilage** when analyzed semi-automatically using computerized edge-detection methods.

15/5/8 (Item 4 from file: 5)

11425311 BIOSIS NO.: 199800206643
Effect of physical exercise on cartilage **volume and thickness in vivo:** MR imaging **study.**
AUTHOR: Eckstein Felix(a); Tieschky Marcus; Faber Sonja C; Haubner Michael; Kolem Heiner; Englmeier Karl-Hans; Reiser Maximillian
JOURNAL: Radiology 207 (1):p243-248 April, 1998
ISSN: 0033-8419

ABSTRACT: PURPOSE: To quantify, with **magnetic resonance** (**MR**) **imaging** , the in vivo changes in **cartilage** volume and thickness after physical exercise. MATERIALS AND METHODS: The patellae of eight volunteers were imaged six **times** at physical rest by using a spoiled fat-suppressed gradient-echo sequence with an acquisition **time** of 4.10 minutes. The volunteers then performed 50 knee bends, and two more data sets were acquired 3-7 minutes and 8-12 minutes after exercise. The patellar **cartilage** volume was determined after **three - dimensional** reconstruction, and the thickness was assessed with a **three - dimensional** minimal-distance algorithm. RESULTS: Whereas repositioning had a small effect on the measurements (mean coefficient of variation, 1.4%), a statistically significant decrease in **cartilage** volume was observed 3-7 minutes (mean decrease, 6.0%; $P < .05$) and 8-12 minutes (mean decrease, 5.2%; $P < .05$) after exercise. The deformation was

homogeneous throughout the joint surface. In one asymptomatic volunteer, a **cartilage** lesion became more pronounced after exercise. CONCLUSION: **MR imaging** can be used to investigate the response of articular **cartilage** to physical exercise in vivo. Patients or volunteers should be allowed a sufficient period of physical rest if **quantitative measurements** of **cartilage volume** and thickness are to be undertaken in longitudinal studies.

15/5/9 (Item 5 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

11394655 BIOSIS NO.: 199800175987
Repeatability of patellar cartilage **thickness patterns in the living, using a fat-suppressed** magnetic resonance imaging **sequence with short acquisition** time **and** three - dimensional **data processing.**
AUTHOR: Tieschky Marcus; Faber Sonja; Haubner Michael; Kolem Heiner; Schulte Erik; Englmeier Karl-Hans; Reiser Maximilian; Eckstein Felix(a)
JOURNAL: Journal of Orthopaedic Research 15 (6):p808-813 Nov., 1997
ISSN: 0736-0266

ABSTRACT: A fast, reproducible, and noninvasive method is required for quantifying **cartilage** thickness clinically and for studying the deformation of articular **cartilage** during and after mechanical loading, in vivo. The objective of the current investigation was to test the repeatability of regional distribution patterns of patellar **cartilage** thickness in the living on the basis of a fat-suppressed **magnetic resonance imaging** sequence with a short acquisition **time** and **three - dimensional** digital data processing. The knees of eight healthy volunteers were transversally imaged with a fat-suppressed FLASH- **3D** (fast low angle shot) sequence (acquisition **time** : 4 minutes and 10 seconds). In each case, the joint was newly positioned before each of the six replicate measurements was taken. The patellar **cartilage** was reconstructed **three - dimensionally** , and the distribution of **cartilage** thickness was determined with a **three - dimensional** minimal-distance algorithm. Whereas the **cartilage** volume ranged from 3,198 to 7,149 mm3, the mean coefficient of variation for the 6-fold **volume measurement** was 1.35%. On average, 75.1% (+- 4.1%) of all test pixels could be attributed to the same **cartilage** thickness **interval** (0.5 mm) by image analysis; 14.8% (+- 2.4%) deviated by one **interval** ; 6.6% (+- 1.5%), by two **intervals** ; and 3.5% (+- 1.8%), by more than two **intervals** . We conclude that, on the basis of a **magnetic resonance imaging** sequence with an acquisition **time** of less than 5 minutes, the quantitative distribution of **cartilage** thickness can be determined with high precision in vivo.

15/5/10 (Item 6 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

10787847 BIOSIS NO.: 199799408992
Non-invasive determination of cartilage **thickness throughout joint surfaces using** magnetic resonance imaging .
AUTHOR: Eckstein F(a); Adam C; Sittek H; Becker C; Milz S; Schulte E; Reiser M; Putz R

JOURNAL: Journal of Biomechanics 30 (3):p285-289 1997
ISSN: 0021-9290

ABSTRACT: Data on articular **cartilage** thickness in the living are important for the design of computer models, aimed at preoperatively assessing the effect of surgical procedures on joint contact and load transmission, and for the calculation of **cartilage** material properties from its deformational behavior as determined during arthroscopy. A non-invasive method for measuring **cartilage** thickness in living subjects is, however, not available. A technique based on **magnetic resonance imaging** has therefore been tested for assessing articular **cartilage** thickness throughout joint surfaces. The accuracy is determined by comparing **cartilage** thickness maps obtained from three patellar specimens with a fat-suppressed **three - dimensional** gradient-echo sequence (resolution 2 **times** 0.31 **times** 0.31 mm) to those obtained with CT arthrography, A-mode ultrasound and anatomical sections. The distribution patterns are **quantitatively compared** using image analysis. The highest agreement was obtained for **MRI** and the sections (50% identical pixels), but all techniques yielded very similar results. On average, **MR**0 slightly underestimated the **cartilage** thickness compared with CT and the sections, and overestimated it compared with ultrasound. No evidence of differences in the degree of similarity could be detected in areas of thin and thick **cartilage** . We conclude that, if the resolution and accuracy of the method presented are considered acceptable, **MRI** is available for be used to determine joint contact and stress in computer models and to calculate **cartilage** material properties in repeatable determination of topographical maps of articular **cartilage** thickness in living subjects. These data can be used to determine joint contact and stress in computer models and to calculate **cartilage** material oroperties in vivo.

15/5/11 (Item 7 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

09963375 BIOSIS NO.: 199598418293
Quantification **of the** volume **of articular** cartilage **in the metacarpophalangeal joints of the hand: Accuracy and precision of** three - dimensional MR imaging .
AUTHOR: Peterfy Charles G(a); Van Dijke Cornelis F; Lu Ying; Nguyen Ann; Connick Thomas J; Kneeland J Bruce; Tirman Phillip F J; Lang Philipp; Dent Sidney; Genant Harry K
JOURNAL: AJR American Journal of Roentgenology 165 (2):p371-375 1995
ISSN: 0361-803X

ABSTRACT: OBJECTIVE: **Cartilage** loss is central to the development of joint failure in arthritis. However, radiographic assessment of **cartilage** loss is highly unreliable. This study examined the accuracy and reproducibility of a noninvasive technique for **quantifying** the **volume** of articular **cartilage** in the metacarpophalangeal joints of the hand by use of **three - dimensional** (**3D**) **MR imaging** . SUBJECTS AND METHODS: Eight metacarpophalangeal joints (four normal, one rheumatoid arthritic, and three normal cadaveric) each were imaged three **times** with a 1.5-T clinical **MR imaging** scanner with a small partial volume coil and a fat-saturated **3D** spoiled gradient-echo sequence optimized for delineating articular **cartilage** . The volumes of **cartilage** over

the metacarpal and phalangeal surfaces were quantified by summing the voxels within segmented **3D** reconstructions of the images. **Cartilage** volumes in the three cadaver joints also were estimated by scraping **cartilage** off the articular surfaces and measuring water displacement in graduated cylinders. These values were used as the gold standard for assessing the accuracy of **cartilage volume quantification** by **MR imaging** . RESULTS: The fat-saturated sequence discriminated the articular **cartilage** from adjacent joint structures with high **contrast** and high spatial resolution. **Cartilage volumes** determined by **MR imaging** for the different subjects ranged from 115 mu-l to 222 mu-l for metacarpal **cartilage** and from 34 pl to 86 mu-l for proximal phalangeal **cartilage** . Accuracy errors for **quantifying cartilage volume** by **MR imaging** were -1.8% (95% confidence **interval** , -3.5% to -0.7%) for metacarpal **cartilage** and 9.1% (4.3% to 14.7%) for proximal phalangeal **cartilage** . Reproducibility errors were 5.2% (95% confidence **interval** , 2.9% to 7.6%) and 9.9% (5.4% to 15.1%), respectively. CONCLUSION: Fat-suppressed T1-weighted **3D MR imaging** provides sufficient contrast and spatial resolution to allow accurate and reproducible **quantification** of articular **cartilage volume** in the metacarpophalangeal joints of the hand. This technique may be useful for monitoring **cartilage** loss in patients with arthritis.

15/5/12 (Item 8 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

09618864 BIOSIS NO.: 199598073782
3D MRI **Volume Sizing of Knee Meniscus** Cartilage .
AUTHOR: Stone Kevin R(a); Stoller David W; Irving Steven G; Elmquist Carolin; Gildengorin Ginny
JOURNAL: Arthroscopy 10 (6):p641-644 1994
ISSN: 0749-8063

ABSTRACT: Meniscal replacement by allograft and meniscal regeneration through collagen meniscal scaffolds have been recently reported. To evaluate the effectiveness of a replaced or regrown meniscal **cartilage** , a method for **measuring** the **size** and function of the regenerated tissue in vivo is required. To solve this problem, we developed and evaluated a **magnetic resonance imaging** (**MRI**) technique to **measure** the **volume** of meniscal tissues. Twenty-one intact fresh cadaver knees were evaluated and scanned with **MRI** for meniscal volume sizing. The sizing sequence was repeated six **times** for each of 21 lateral and 12 medial menisci. The menisci were then excised and **measured** by water **volume** displacement. Each **volume** displacement **measurement** was repeated six **times** . The **MRI** technique employed to **measure** the **volume** of the menisci was shown to correspond to that of the standard **measure** of **volume** and was just as precise. However, the **MRI** technique consistently underestimated the actual volume. The average of the coefficient of variation for lateral volumes was 0.04 and 0.05 for the water and the **MRI** measurements, respectively. For medial measurements it was 0.04 and 0.06. The correlation for the lateral menisci was r = 0.45 (p = 0.04) and for the medial menisci it was r = 0.57 (p = 0.05). We conclude that **3D MRI** is precise and repeatable but not accurate when used to **measure** meniscal **volume** in vivo and therefore may only be useful for evaluating changes in meniscal allografts and meniscal regeneration templates over **time** .

15/5/13 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

05159221 E.I. No: EIP98114466720
Title: Relevanz suszeptibilitaetsinduzierter geometrischer Fehlkodierungen fuer die Validitaet MR **-basierter Knorpelvolumen-und-dickenmessungen im Kniegelenk**
Title: Relevance of susceptibility-induced geometrical distortion for the accuracy of **MR** -based **cartilage volume** and thickness **measurement**
Author: Schnier, M.; Priebsch, J.; Faber, S.; Haubner, M.; Glaser, C.; Englmeier, K.-H.; Reiser, M.; Eckstein, F.
Source: Biomedizinische Technik/Biomedical Engineering v 43 n 9 Sep 1998. p 243-248
CODEN: BMZTA7 ISSN: 0013-5585
Language: German
Abstract: The aim of the present study was to analyze the relevance of susceptibility-induced geometrical distortion to the accuracy of **MR** -based **cartilage volume** and thickness **measurement** in the human knee joint. Nine cadaveric knee joints were imaged in the sagittal plane with **MRI** at a resolution of 2 multiplied by 0.31 multiplied by 0.31 mm**3, using a fat-suppressed gradient echo sequence, with a normal gradient orientation and also with the frequency- and phase-encoding directions changed. CT arthrographic data sets were then obtained. On the basis of **3 - D** constructions, we determined the **cartilage** volume and, with a **3 - D** minimal distance algorithm, the thickness distribution, of the patella, femur and tibia. Irrespective of the gradient orientation, good agreement was observed between **MRI** and CT arthrography in terms of **cartilage** volumes and maximum **cartilage** thickness. With a normal gradient orientation the volume was overestimated by 2.5% in **MRI** , and 2.3% when the gradients were changed. The maximum **cartilage** thickness was underestimated by 0.24 **intervals** (**interval** equals 0.5 mm) with a normal gradient orientation, and by 0.22 **intervals** when the gradient orientation was changed. In none of the joint surfaces was a relevant difference between the two methods observed. It can be shown that, using high-resolution, fat-suppressed gradient-echo sequences - susceptibility-induced geometrical distortion has no significant effect on the accuracy of **MR** -based **cartilage volume** and thickness **measurements** . **MRI** would therefore appear suitable for the design of patient-specific finite element models with the aim of analyzing load transmission in diarthrodial joints and planning surgical interventions. (Translated author abstract) 20 Refs.

15/5/14 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

06891317 Genuine Article#: ZZ288 Number of References: 31
Title: Accuracy of cartilage volume **and thickness** measurements **with** magnetic resonance imaging
Author(s): Eckstein F (REPRINT) ; Schnier M; Haubner M; Priebsch J; Glaser C; Englmeier KH; Reiser M
Journal: CLINICAL ORTHOPAEDICS AND RELATED RESEARCH, 1998, N352 (JUL), P 137-148
ISSN: 0009-921X Publication date: 19980700
Abstract: A noninvasive **imaging** technique for quantifying articular

cartilage is needed for diagnosis, monitoring, and therapy control in osteoarthritis. In this study the accuracy of **three - dimensional cartilage volume** and thickness **measurements** in the knee with **magnetic resonance imaging** was analyzed. Eight cadaveric specimens had sagittal **imaging** with a fat suppressed gradient echo sequence. After a contrast agent was injected, two sagittal **computed tomography** data sets were obtained, with the knees being repositioned between the examinations. The **cartilage** thickness was determined, after **three - dimensional** reconstruction, using a minimal distance algorithm. The mean absolute volume deviation between **magnetic resonance imaging** and **computed tomography** arthrography was 3.3% and that between the two **computed tomography** data sets was 3.6%. The absolute error in determining the maximal **cartilage** thickness with **magnetic resonance imaging** was on average 0.6 **intervals** (of 0,5-mm thickness) and that between the **computed tomography** examinations was 0.5 **intervals** . In a patient with anterior knee pain, a focal **cartilage** defect was seen with **magnetic resonance imaging** , and this was verified by arthroscopic examination. Using **three - dimensional** image processing, **magnetic resonance imaging** can provide accurate data on **cartilage** volume and thickness in the human knee joint surfaces, This **imaging** technique potentially may be valuable in the treatment of patients with joint disease.

15/5/15 (Item 2 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

06874368 Genuine Article#: ZY465 Number of References: 29
Title: MR imaging **of hyaline** cartilage **at 0.5 T: a quantitative and qualitative in vitro evaluation of three types of sequences**
Author(s): vanderLinden E (REPRINT) ; Kroon HM; Doornbos J; Hermans J; Bloem JL
Journal: SKELETAL RADIOLOGY, 1998, V27, N6 (JUN), P297-305
ISSN: 0364-2348 Publication date: 19980600
Abstract: Objective. To identify an optimal pulse sequence for in vitro **imaging** of hyaline **cartilage** at 0.5 T.

Materials and methods. Twelve holes of varying diameter and depth were drilled in **cartilage** of two pig knees. These were submerged in saline and scanned with a 0.5-T **MR** system. Sixteen TI-weighted gradient echo (GE), two T2-weighted GE, and 16 fast spin echo sequences were used, by varying repetition **time** (TR), echo **time** (TE), flip angle (FA), echo train length, profile order, and by use of fat saturation. Contrast-to-noise ratios (CNR) of **cartilage** versus saline solution and **cartilage** versus subchondral bone were measured. **Cartilaginous** lesions were evaluated separately by three independent observers. Interobserver variability and **correlation** between the **quantitative** and qualitative analyses were calculated.

Results. The mean CNRs of two specimens of **cartilage** versus saline solution ranged from 6.3 (+/-2.1) to 27.7 (+/-2.5), and those of **cartilage** versus subchondral bone from 0.3 (+/-0.2) to 22.5 (+/-1.4). The highest CNR was obtained with a T1-weighted spoiled **3D** -GE technique (TR 65 ms, TE 11.5 ms, FA 45 degrees). The number of lesions observed per sequence varied from 35 to 69. Observer agreement was fair to good. The T1-weighted spoiled GE sequences with a TR of 65 ms, TE of

11.5 ms and FA of 30 degrees and 45 degrees were significantly superior to the other 34 sequences in the qualitative analysis.

Conclusion. T1-weighted spoiled **3D** -GE sequences with a TR of 65 ms, a TE of 11.5 ms, and a FA of 30-45 degrees were found to be optimal for in vitro **imaging** of **cartilage** at 0.5 T.

15/5/16 (Item 3 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

06831934 Genuine Article#: ZV355 Number of References: 41
Title: Quantitative MR imaging **evaluation of chondropathy in osteoarthritic knees**
Author(s): Drape JL (REPRINT) ; Pessis E; Auleley GR; Chevrot A; Dougados M ; Ayral X
Journal: RADIOLOGY, 1998, V208, N1 (JUL), P49-55
ISSN: 0033-8419 Publication date: 19980700
Abstract: PURPOSE: To determine the validity and the reliability of T1-weighted **three - dimensional** gradient-echo **magnetic resonance** (**MR**) **imaging** for quantification of articular **cartilage** abnormalities of osteoarthritic knees.

MATERIALS AND METHODS: Forty-three patients (mean age, 63 **years**) with knee osteoarthritis (American College of Rheumatology criteria) of the medial tibiofemoral compartment underwent a prospective, cross-sectional study. Knees were examined with a T1-weighted **three - dimensional** gradient-echo sequence (1.4-mm contiguous sections), with use of a 0.2-T dedicated **MR** unit, before arthroscopic exploration. The tibiofemoral articular **cartilage** abnormalities were quantified blindly on both the **MR** and arthroscopic images with the French Society of Arthroscopy (SFA) score (0-100) and grading scheme (five grades).

RESULTS: There was a statistically significant correlation between the SFA-arthroscopic score and the SFA- **MR** score (r = .83) and between the SFA-arthroscopic grade and the SFA- **MR** grade (weighted kappa = 0.84). The deepest **cartilage** lesions graded with arthroscopy and **MR imaging** showed correlation in the medial femoral condyle (weighted kappa = 0.83) and in the medial tibial plateau (weighted kappa = 0.84). The intraobserver reliability of the SFA- **MR** score was higher (r = .94) than the interobserver reliability (r = .80).

CONCLUSION: Quantification of chondropathy with **MR imaging** is feasible and well correlated with anatomic **cartilage** breakdown.
Descriptors--Author Keywords: arthroscopy ; **cartilage** ; **cartilage, MR** ; **k** nee, arthritis ; **magnetic resonance** (**MR**), **comparative** studies ; **magnetic resonance** (**MR**), **volume measurement**

15/5/17 (Item 4 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

06515531 Genuine Article#: YY262 Number of References: 33
Title: In vivo reproducibility of three - dimensional cartilage volume **and thickness** measurements **with** MR imaging

Author(s): Eckstein F (REPRINT) ; Westhoff J; Sittek H; Maag KP; Haubner M; Faber S; Englmeier KH; Reiser M
Journal: AMERICAN JOURNAL OF ROENTGENOLOGY, 1998, V170, N3 (MAR), P593-597
ISSN: 0361-803X Publication date: 19980300
Abstract: OBJECTIVE. Previous studies suggest that **MR imaging** is capable of providing accurate data on knee joint **cartilage** volume and thickness in vitro, but the reproducibility of these data in living subjects has not been analyzed rigorously. Our aim was therefore to determine the in vivo reproducibility of **volume** -and thickness **measurements** from replicated data sets, applying **three - dimensional** (**3D**) postprocessing methods.

SUBJECTS AND METHODS. Eight healthy volunteers were imaged six **times** at a resolution of 2 x 0.31 x 0.31 mm with a fat-suppressed fast low-angle shot **3D** sequence, the knee being repositioned in between replicated examinations. **Three - dimensional** reconstructions of the articular **cartilage** surfaces were obtained from sagittal data sets, and the **cartilage** volumes were calculated. The thickness distribution was analyzed throughout the joint surfaces independent of the section orientation, using a previously validated **3D** minimal-distance algorithm.

RESULTS. In the volunteers, the coefficient of variation for replicated **volume measurements** ranged from 1.3% (patella) to 3.4% (lateral tibia), and the standard deviation of the individual **cartilage** volumes ranged from +/-16% (lateral tibia) to +/-22% (femur). The intraclass correlation coefficient ranged from .959 (lateral tibia) to .995 (patella). The interobserver evaluation was similar to the interscan reproducibility. The mean interscan deviation of the maximal **cartilage** thickness **interval** ranged from 0.1 to 0.3 **cartilage** thickness **intervals** (of 0.5 mm); only in rare cases did we record deviations greater than one thickness **interval** .

CONCLUSION. **MR imaging** can be used to determine **cartilage** volume and thickness in the knee joints of living subjects with high precision, provided that a fat-suppressed gradient-echo sequence with adequate resolution and **3D** digital image processing are used.

15/5/18 (Item 5 from file: 34)

Shoulder v. knee

06328242 Genuine Article#: YJ576 Number of References: 30
Title: Acromiohumeral distance and acromial shape assessed by three - dimensional computed tomography **in patients with supraspinatus outlet syndrome**
Author(s): Lochmuller EM (REPRINT) ; Anetzberger H; Maier U; Habermeyer P; MullerGerbl M
Journal: UNFALLCHIRURG, 1997, V100, N11 (NOV), P874-879
ISSN: 0177-5537 Publication date: 19971100
Language: German Document Type: ARTICLE
Abstract: Mechanical irritations of the supraspinatus tendon due to a reduction of the subacromial space are considered to be a potential cause of supraspinatus outlet syndrome. The aim of the current study was, therefore, to provide a method of improved measurement of the acromiohumeral distance and the evaluation of the acromial shape. In

seven patients aged 50-60 **years** with unilateral supraspinatus outlet syndrome, **imaging** with standardized, high-resolution **computed tomography** (CT) was performed in order to demonstrate the acromion and the subacromial space **three - dimensionally** . The acromiohumeral distance was measured in three reconstructed frontal sections, and the two sides of each patient were directly **compared** . The acromial **shape** was **compared** with the classification of Bi-gliani as derived from conventional radiography.

Whereas the Constant Score was found to be significantly reduced in the diseased shoulders ($p < 0.01$), the acromiohumeral distance was not significantly lower in three standardized frontal sections. In five cases the classification of the acromial form from the conventional radiograph was confirmed by **3D** CT, whereas in two cases it was shown to be different. Our results suggest that primary or secondary changes of the acromial form can be more accurately evaluated with **3D** CT than with conventional radiography. A direct comparison of the two sides in patients with supraspinatus syndrome does not suggest a reduction of acromiohumeral distance in the diseased shoulder.

15/5/19 (Item 6 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

06134023 Genuine Article#: XX326 Number of References: 38
Title: A non-invasive technique for 3 - dimensional **assessment of articular** cartilage **thickness based on** MRI **.2. Validation using CT arthrography**
Author(s): Haubner M (REPRINT) ; Eckstein F; Schnier M; Losch A; Sittek H; Becker C; Kolem H; Reiser M; Englmeier KH
Journal: MAGNETIC RESONANCE IMAGING, 1997, V15, N7, P805-813
ISSN: 0730-725X Publication date: 19970000
Abstract: Established methods for the measurement of articular **cartilage** thickness are invasive and cannot be sequentially applied in living subjects, In the present study, the distribution of **cartilage** thickness throughout entire joint surfaces was determined from **MR** images obtained with a fat-suppressed gradient-echo sequence at a resolution of 0.31 x 0.31 x 2.00 mm(3), and compared to that derived from CT arthrography. A minimal distance algorithm was employed to produce **3D** **cartilage** thickness maps of seven cadaveric human knee joints, The mean amount of deviation of the **cartilage** volumes was 5.6% (+/-4.6), statistical analysis showing that there was high agreement between the two methods ($r = 0.995$, slope = 1.037, y-intercept = -90.5 mm(3)), The **3D** thickness maps yielded a striking agreement between the two methods, the maximum values generally yielding a deviation of none or one thickness **interval** of 0.5 mm, This investigation shows that accurate **3D** assessment of articular **cartilage** thickness can be performed with **MRI** , this technique having the advantage that it is suitable for investigating living subjects,

15/5/20 (Item 7 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

05409745 Genuine Article#: VW753 Number of References: 14
Title: QUANTIFICATION OF ARTICULAR- CARTILAGE **IN THE KNEE WITH** 3 - DIMENSIONAL MR - IMAGING
Author(s): DUPUY DE; SPILLANE RM; ROSOL MS; ROSENTHAL DI; PALMER WE; BURKE DW; ROSENBERG AE
Journal: ACADEMIC RADIOLOGY, 1996, V3, N11 (NOV), P919-924
ISSN: 1076-6332
Abstract: Rationale and Objectives. To determine the volume of articular **cartilage** in cadavers, patients, and healthy volunteers by using a volumetric, fat-suppressed spoiled gradient-recalled signal acquisition in the steady state (SPGR) **magnetic resonance** (**MR**) sequence.

Methods. Sagittal **MR** images were obtained with a fat-suppressed SPGR sequence (repetition **time** , 52 msec; echo **time** , 10 msec; 60 degrees flip angle; 3.0-3.5-mm partitions, 256 x 192 matrix, two signals acquired). The **cartilaginous** surfaces of the tibia, femur, and patella were planimetrically defined with a **three - dimensional** workstation. A **three - dimensional** model volume was created by threshold segmenting the **cartilage** from the adjacent tissues. The volume as calculated by using **MR imaging** was **compared** with the actual **volume** of the **cartilage** specimens.

Result. Observed **measurements correlated** with actual weight and **volume** displacement **measurements** with an accuracy of 82%-99% and linear correlation coefficients of 0.99 (P = 2.5(e-15)) and 0.99 (P = 4.4(e-15)). Precision of segmentation in healthy volunteers yielded a coefficient of variation of 0.4% for interobserver variability and 0.3% for intraobserver variability.

Conclusion. This pilot study suggests that accurate volumetric calculations of knee articular **cartilage** are possible with currently available **MR imaging** pulse sequences and a commercially available work station.

15/5/21 (Item 8 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

04987744 Genuine Article#: UX322 Number of References: 58
Title: MORPHOLOGICAL DEFICIENCY IN THE PRENATAL ANTERIOR CRANIAL BASE OF MIDFACIALLY RETROGNATHIC MICE
Author(s): MA WB; LOZANOFF S
Journal: JOURNAL OF ANATOMY, 1996, V188, JUN (JUN), P547-555
ISSN: 0021-8782
Abstract: The role of the anterior cranial base in the establishment of midfacial retrognathia remains unclear. The purpose of this study was to determine whether morphological deficiencies occur in the developing anterior cranial base of the retrognathic Brachyrrhine (3H1 Br/+) mouse mutant shortly after overt **cartilaginous** differentiation and to localise any malformations. Crania from 2 groups of 3H1 Br/+ and +/+ mice, each consisting of 15 animals, were collected at gestational **days** 15, 17 and 19 (Theiler stages 23, 25, 27). The anterior cranial base from each specimen was subjected to computerised reconstruction and 8 homologous anatomical landmarks were digitised on each model. The landmark configurations were subjected to Procrustes analysis and significant differences between models were determined at each age. In

order to localise differences between forms, average landmark configurations derived from Procrustes analysis were subjected to finite-element analysis. Two cluster models were generated based on size-change values. One cluster was located anteriorly and superiorly while the second was located posteriorly and inferiorly within the anterior cranial base. Results indicate that the size-change values for the posterior and inferior cluster increased more rapidly **compared** with the anterior and superior **region** over the age range tested. These data indicate that the midfacial retrognathia in Br/+ mice is associated with abnormal growth activity in the presphenoid component of the presumptive anterior cranial base. In addition, the deficiency is present in the presphenoid at the **time** of overt **cartilaginous** differentiation.

15/5/22 (Item 9 from file: 34)

04429753 Genuine Article#: TC209 Number of References: 26
Title: MR - IMAGING **OPTIMIZATION OF THE ARTICULAR HIP** CARTILAGE **BY USING A T-1-WEIGHTED** 3 - DIMENSIONAL **GRADIENT-ECHO SEQUENCE AND THE APPLICATION OF A HIP-JOINT TRACTION**
Author(s): ROSENBERG R; BERND L; WRAZIDLO W; LEDERER W; SCHNEIDER S
Journal: FORTSCHRITTE AUF DEM GEBIETE DER RONTGENSTRAHLEN UND DER NEUEN BILDGEBENDEN VERFAHREN, 1995, V163, N4 (OCT), P321-329
ISSN: 0936-6652
Language: GERMAN Document Type: ARTICLE
Abstract: Purpose: The Purpose of this study was to examine the accuracy of **MR - Imaging** of the healthy and the arthrotically altered articular hip **cartilage** with in vivo and in vitro separation of femoral head **cartilage** and acetabular **cartilage** .

Material and methods: Images of three animal cadaver hips, 8 dissected patient femoral heads and 18 hip joints of human corpses, all either with arthrosis stage I-III or artificial **cartilage** defects, were compared with their corresponding anatomic sections, Additional histomorphologic examinations of the arthrotic **cartilages** were conducted, and **MR - Imaging** of 20 healthy and 21 arthrotic patient hips was performed using a specific traction method.

Results: Using a T-1-weighted **3 - dimensional** gradient-echo sequence and a traction of the hip joint, it was possible due to the low-signal **imaging** of the joint space to separate in vivo the high-signal femoral head **cartilage** from the high-signal acetabular **cartilage** , In horizontal position of the phase-encoding parameter, minimisation of the chemical-shift artifact, mainly in the ventro-lateral **areas** , was accomplished. **MRI measurements** of the articular **cartilage** widths showed significant correlations ($p<0.001$) with the corresponding anatomic sections. At the same **time** the T-1 **3 - dimensional** gradient-echo sequence of the lateral femoral head with $r=0.94$ showed the lowest deviations of the measurements. It was possible with **MR - Imaging** to distinguish four **cartilage** qualitites.

Conclusions: Using these **MR** -examinations, an improved **imaging** of early stage arthrotic **cartilage** defects is possible, and the

status of the arthrotic hip **cartilage** with regard to intertrochanteric osteotomy can also be assessed.

15/5/23 (Item 10 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

01633006 Genuine Article#: HM915 Number of References: 31
Title: ULTRASONOGRAPHY IN THE STUDY OF PREVALENCE AND CLINICAL EVOLUTION OF POPLITEAL CYSTS IN CHILDREN WITH KNEE EFFUSIONS
Author(s): SZER IS; KLEINGITELMAN M; DENARDO BA; MCCAULEY RGK
Journal: JOURNAL OF RHEUMATOLOGY, 1992, V19, N3 (MAR), P458-462
Abstract: The prevalence and clinical evolution of popliteal cysts in children with knee arthritis is not well known. Using ultrasonography, we studied 44 children with clinically detectable knee effusions secondary to juvenile rheumatoid arthritis (n = 35), spondyloarthritis (n = 3) and psoriatic (n = 2), septic (n = 2) and lupus (n = 2) associated arthritis. Popliteal cysts, defined as anechoic or hypoechoic masses measuring at least 1 cm in 2 of **3 dimensions** , were identified in 27 children (61%). Of the 30 children with bilateral arthritis, 11 (37%) had bilateral cysts. The size of the cysts ranged from 1 to 40 cm3 (median 3.0 cm3). There was a significant correlation between the presence of a cyst and popliteal pain and the size of the suprapatellar effusion ($p < 0.001$) but not the child's age or underlying diagnosis ($p < 0.05$). A cohort of 25/27 children with cysts were followed prospectively with serial sonograms for 18-24 **months** . The resolution of the cyst followed that of the suprapatellar effusion in those children whose arthritis improved or resolved. Two children (8%) had rupture of the popliteal cysts. Popliteal cysts are readily documented in children with knee effusions using ultrasonography, and their presence and evolution **correlates** with the **size** of the suprapatellar effusion.

15/5/24 (Item 1 from file: 73)
DIALOG(R)File 73:EMBASE

07509505 EMBASE No: 1998406234
Postnatal development of Eustachian tube: A computer-aided 3 - d reconstruction and measurement study
Suzuki C.; Balaban C.; Sando I.; Sudo M.; Ganbo T.; Kitagawa M.
Dr. I. Sando, Division of Otopathology, Department of Otolaryngology,
Acta Oto-Laryngologica (ACTA OTO-LARYNGOL.) (Norway) 1998, 118/6 (837-843)
CODEN: AOLAA ISSN: 0001-6489
DOCUMENT TYPE: Journal; Article

ear v knee

The postnatal development of the Eustachian tube (et) and its surrounding structures was investigated by means of computer-aided **three - dimensional** (**3 - d**) reconstruction methods in 13 normal human temporal bones, obtained from individuals 3 **months** to 71 **years** old. The cross-sectional area, width and height of the lumen in most of the **cartilaginous** portion of the Et were significantly smaller in children than in adults. In particular, there was a marked, age-associated difference in the shape of the lumen in the **cartilaginous** portion of the

Et. In adults, the cross-sectional area of the lumen declined monotonically between a large opening at the pharyngeal orifice and the narrowest portion of the Et (near the border of the **cartilaginous** and junctional **regions**). In children, by **contrast** , the Et lumen was uniformly smaller over the first 80% of its length from the pharyngeal orifice. It is suggested that this immature morphology of the Et lumen may confer increased risk of developing otitis media during childhood.

15/5/25 (Item 2 from file: 73)
DIALOG(R)File 73:EMBASE

06308966 EMBASE No: 1995331102
MR - Imaging **optimisation of the articular hip** cartilage **by using a Tinf 1-weighted** 3 - dimensional **gradient-echo sequence and the application of a hip joint traction**
MAGNETRESONANZTOMOGRAPHISCHE OPTIMIERUNG DER HUFTKMORPELDARSTELLUNG DURCH DIE WAHL EINER Tinf 1-VOLUMEN-GRADIENTEN-ECHO-SEQUENZ UND DIE ANWENDUNG EINER HUFTGELENKSTRAKTION
Rosenberg R.; Bernd L.; Wrazidlo W.; Lederer W.; Schneider S.
RoFo Fortschritte auf dem Gebiete der Rontgenstrahlen und der Neuen Bildgebenden Verfahren (ROFO FORTSCHR. GEB. RONTGENSTR. NEUEN BILDGEBENDEN VERFAHREN) (Germany) 1995, 163/4 (321-329)
CODEN: RFGVE ISSN: 0936-6652
LANGUAGE: GERMAN SUMMARY LANGUAGE: GERMAN; ENGLISH

Purpose: The Purpose of this study was to examine the accuracy of **MR - Imaging** of the healthy and the arthrotically altered articular hip **cartilage** with in vivo and in vitro separation of femoral head **cartilage** and acetabular **cartilage** . Material and methods: Images of three animal cadaver hips, 8 dissected patient femoral heads and 18 hip joints of human corpses, all either with arthrosis stage I-III or artificial **cartilage** defects, were compared with their corresponding anatomic sections. Additional histomorphologic examinations of the arthrotic **cartilages** were conducted, and **MR - Imaging** of 20 healthy and 21 arthrotic patient hips was performed using a specific traction method. Results: Using a Tinf 1-weighted **3 - dimensional** gradient echo sequence and a traction of the hip joint, it was possible due to the low-signal **imaging** of the joint space to separate in vivo the high-signal femoral head **cartilage** from the high-signal acetabular **cartilage** . In horizontal position of the phase-encoding parameter, minimisation of the chemical-shift artifact, mainly in the ventro-lateral **areas** , was accomplished. **MRI measurements** of the articular **cartilage** widths showed significant correlations ($p < 0.001$) with the corresponding anatomic sections. At the same **time** the Tinf 1 **3 - dimensional** gradient-echo sequence of the lateral femoral head with $r = 0.94$ showed the lowest deviations of the measurements. It was possible with **MR - Imaging** to distinguish four **cartilage** qualitites. Conclusions: Using these **MR** -examinations, an improved **imaging** of early stage arthrotic **cartilage** defects is possible, and the status of the arthrotic hip **cartilage** with regard to intertrochanteric osteotomy can also be assessed.

15/5/26 (Item 1 from file: 144)
DIALOG(R)File 144:Pascal

13547173 PASCAL No.: 98-0248275

An MR **-based technique for quantifying the deformation of articular** cartilage **during mechanical loading in an intact cadaver joint**

HERBERHOLD C; STAMMBERGER T; FABER S; PUTZ R; ENGLMEIER K H; REISER M; ECKSTEIN F

Journal: Magnetic resonance in medicine, 1998, 39 (5) 843-850

ISSN: 0740-3194 CODEN: MRMEEN Availability: INIST-20644; 354000075823810210

The objective of this study was to develop an **MR** -based technique for quantifying the deformation of articular **cartilage** during mechanical loading in an intact cadaver joint at high spatial and temporal resolution. A nonmetallic pressure device was constructed for applying loads of >1000 N to a femoro-patellar articulation within an extremity coil of a clinical 1.5 T **MRI** scanner. Digital image processing methods were used to determine the location- and **time** -dependent **cartilage** deformation in consecutive 2D fat-suppressed FLASH images. Additionally, **three - dimensional** reconstruction of the **cartilage** was performed from **3D** fat-suppressed FLASH image data. During the first 10 min of static compression, thickness changes between 10 and 30% were observed. Thickness changes greater than 50% and volume changes of 20% were recorded after 3 h. The technique permits analysis of the load and **time** -dependent mechanical behavior of articular **cartilage** in its natural environment.

15/5/27 (Item 1 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

11570140 99001797 PMID: 9785618

Relevance of susceptibility-induced geometrical distortion for validity of MRI **-based** cartilage volume **and density** measurements **of the knee joint]**

Relevanz suszeptibilitatsinduzierter geometrischer Fehlkodierungen fur die Validitat **MR** -basierter Knorpelvolumen- und -dickenmessungen im Kniegelenk.

Schnier M; Priebsch J; Faber S; Haubner M; Glaser C; Englmeier K H; Reiser M; Eckstein F

Biomedizinische Technik. Biomedical engineering (GERMANY) Sep 1998, 43 (9) p243-8, ISSN 0013-5585 Journal Code: 1262533

Languages: GERMAN

The aim of the present study was to analyze the relevance of susceptibility-induced geometrical distortion to the accuracy of **MR** -based **cartilage volume** and thickness **measurement** in the human knee joint. Nine cadaveric knee joints were imaged in the sagittal plane with **MRI** at a resolution of 2 x 0.31 x 0.31 mm3, using a fat-suppressed gradient echo sequence, with a normal gradient orientation and also with the frequency- and phase-encoding directions changed. CT arthrographic data sets were then obtained. On the basis of **3 - D** constructions, we determined the **cartilage** volume and, with a **3 - D** minimal distance algorithm, the thickness distribution, of the patella, femur and tibia. Irrespective of the gradient orientation, good agreement was observed between **MRI** and CT arthrography in terms of **cartilage** volumes and maximum **cartilage** thickness. With a normal gradient orientation the volume was overestimated by 2.5% in **MRI** , and 2.3% when the gradients were changed. The maximum **cartilage** thickness was underestimated by 0.24 **intervals** (**interval** =

0.5 mm) with a normal gradient orientation, and by 0.22 **intervals** when the gradient orientation was changed. In none of the joint surfaces was a relevant difference between the two methods observed. It can be shown that, using high-resolution, fat-suppressed gradient-echo sequences--susceptibili ty-induced geometrical distortion has no significant effect on the accuracy of **MR** -based **cartilage** **volume** and thickness **measurements** . **MRI** would therefore appear suitable for the design of patient-specific finite element models with the aim of analysing load transmission in diarthrodial joints and planning surgical interventions.

15/5/28 **(Item 2 from file: 155)**
DIALOG(R)File 155:MEDLINE(R)

10268235 96069966 PMID: 7579219

The magnetic resonance **tomographic optimization of hip joint** cartilage **visualization by the selection of a T1-volume gradient-echo sequence and the use of hip-joint traction]**

Magnetresonanztomographische Optimierung der Huftknorpeldarstellung durch die Wahl einer T1-Volumen-Gradienten-Echo-Sequenz und die Anwendung einer Huftgelenkstraktion.

Rosenberg R; Bernd L; Wrazidlo W; Lederer W; Schneider S

RoFo. Fortschritte auf dem Gebiete der Rontgenstrahlen und der neuen bildgebenden Verfahren (GERMANY) Oct 1995, 163 (4) p321-9, ISSN 1438-9029 Journal Code: 9112114

Languages: GERMAN

PURPOSE: The purpose of this study was to examine the accuracy of **MR** **imaging** of the healthy and the arthrotically altered articular hip **cartilage** with in vivo and in vitro separation of femoral head **cartilage** and acetabular **cartilage** . MATERIAL AND METHODS: Images of three animal cadaver hips, 8 dissected patient femoral heads and 18 hip joints of human corpses, all either with arthrosis stage I-III or artificial **cartilage** defects, were compared with their corresponding anatomic sections. Additional histomorphologic examinations of the arthrotic **cartilages** were conducted, and **MR - Imaging** of 20 healthy and 21 arthrotic patient hips was performed using a specific traction method. RESULTS: Using a T1-weighted **3 - dimensional** gradient-echo sequence and a traction of the hip joint, it was possible due to the low-signal **imaging** of the joint space to separate in vivo the high-signal femoral head **cartilage** from the high-signal acetabular **cartilage** . In horizontal position of the phase-encoding parameter, minimisation of the chemical-shift artifact, mainly in the ventro-lateral **areas** , was accomplished. **MRI** **measurements** of the articular **cartilage** widths showed significant correlations ($p < 0.001$) with the corresponding anatomic sections. At the same **time** the T1 **3 - dimensional** gradient-echo sequence of the lateral femoral head with $r = 0.94$ showed the lowest deviations of the measurements. It was possible with **MR** **imaging** to distinguish four **cartilage** qualities. CONCLUSIONS: Using these **MR** -examinations, an improved **imaging** of early stage arthrotic **cartilage** defects is possible, and the status of the arthrotic hip **cartilage** with regard to intertrochanteric osteotomy can also be assessed.

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Set     Items   Description
S1     198906   CARTILAG?
S2    1084988   3D OR (THREE OR 3)()(D OR DIMENSION?) OR 3DIMENSION? OR TH-
             REED
S3    2548695   IMAGING OR MRI OR MAGNETIC()RESONANCE? OR M()R()I OR CT(2N-
             )SCAN???? OR COMPUTED()TOMOGRA? OR MR
S4   16900872   VOLUM? OR SIZE? OR SHAPE? OR AREA? OR REGION? OR AMOUNT? OR
              QUANTIT?
S5   23561494   COMPAR? OR CORRELAT? OR CONTRAST? OR MEASUR? OR QUANTIF?
S6   15917854   INTERVAL? OR TIME? ? OR DAYS OR WEEKS OR MONTHS OR YEARS OR
              PERIODS
S7    1323571   S4(5N)S5
S8       3944   S7(S)(S2(5N)S3)
S9         47   S8(S)S1(S)S6
S10        17   S9 NOT PY>1998
S11         5   RD (unique items)
S12       159   S7 AND S2 AND S3 AND S1 AND S6
S13        73   S12 NOT PY>1998
S14        73   S13 NOT PD>19981216
S15        28   RD (unique items)
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File  71:ELSEVIER BIOBASE 1994-2003/Mar W4
         (c) 2003  Elsevier Science B.V.
File  91:MANTIS(TM) 1880-2002/Oct
         2002 (c) Action Potential
File 162:CAB Health 1983-2003/Jan
         (c) 2003 CAB International
File 164:Allied & Complementary Medicine 1984-2003/Mar
          (c) 2003 BLHCIS
File 467:ExtraMED(tm) 2000/Dec
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